Investigation of Traffic Safety Culture among Greek Drivers

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Abstract. During the last years, the importance of Traffic Safety Culture (TSC) for the improvement of road safety is becoming increasingly recognized. Greece is performing poorly in road safety among the European Union countries. The aim of this study is to present the methodology developed for the investigation of TSC of Greek drivers belonging to different socio-economic units. The methodology includes quantitative surveys among and qualitative interviews with professional drivers, private car and motorcycle drivers, drivers in Athens and on the island of Rhodes. Specially designed survey questionnaires and semi-structured interview guides were developed covering demographics, behavior at individual level and national level, paternalism, enforcement, accident causation and road safety outcomes to shed light on TSC at organizational and local level. The purpose of the qualitative interviews was for interviewees to highlight the main themes and questions in the survey, and to speak openly providing more information than the questionnaires allowed. Emphasis was given to concrete examples, potential influence of other road users on drivers and what affects common ways of driving and behaving in social groups at different levels. Overall, 503 private vehicle drivers and 202 professional HGV and bus drivers were surveyed, and 30 and 20, respectively, were interviewed.

Keywords: Traffic Safety Culture, Questionnaire Survey, Semi-Structured Interviews, Trust Project

1 Introduction

The concepts of safety culture has traditionally been applied to organizations. The relationship between organizational safety culture and safety outcomes is well-documented in meta analyses of organizational safety [1], including in the road sector [2], [3].

In order to exploit the full potential of the safe culture perspective as a tool for developing road safety measures, the concept should be employed to analytical units additional to organizations and particular to sectors and peer-groups [4], [5].

Given the potential importance of the safety culture perspective for road safety, it should also be applied to private drivers-particularly those belonging to high-risk groups such as young drivers and motorcyclists. However, only a limited number of studies have examined TSC in relation to private drivers [6], [7].

Professional drivers differ from private drivers in several key respects. First, unless self-employed, professional drivers operate within an employment relationship and are part of formal work organizations. Second, professional drivers often face deadlines and customer demands, and studies indicate that perceived time pressure and stress also affect their traffic safety behavior [8], [9].

Greece is 4th out of 27 EU countries in terms of the highest numbers of road fatalities per million inhabitants [10]. Research on TSC and its importance for traffic safety is necessary to enhance knowledge about how it can be exploited to increase traffic safety in Greece. This study presents the methodology developed for the investigation of TSC of Greek drivers belonging to different socio-economic units.

2 Traffic Safety Culture

TSC is a relatively new analytical concept, and although there are no commonly accepted definitions of TSC [5], several of the existing definitions include values and attitudes [11], [12]. We define TSC as shared values and attitudes signifying what is important (e.g. safety, mobility, respect, politeness), shared norms prescribing certain traffic safety behaviors, and thus shared patterns of behavior and shared expectations regarding the behaviors of others [13].

Individuals' perceptions of peers' approval or disapproval of a given behavior are typically referred to as injunctive norms, whereas perceptions of what peers actually do are known as descriptive norms [14], [6]. Descriptive norms may shape behavior by signaling what is considered normal or typical [14]. For example, research on TSC conceptualised as descriptive norms found that these norms predicted individuals' own safety behaviors, which in turn influenced their crash risk [15]. The used definition of TSC also includes values and attitudes, as previous studies indicate a relationship between these and traffic safety.

3 Investigation of TSC among Greek drivers

Exploiting the knowledge discussed in the previous sections and given that TSC of Greek drivers had never been the subject of research before, efforts were made to fill this gap through an empirical study among groups of Greek drivers belonging to different socio-economic units such as:

- professional bus and Heavy Good Vehicles (HGV) drivers
- private drivers of passenger cars and motorcycles
- drivers in Athens (the capital) and Rhodes (Greek island).

An empirical study was therefore conducted, aiming to explore TSC by:

- comparing safety behaviors of different groups,
- examining factors influencing traffic safety behaviors and

- examining the influence of traffic safety behaviors and other factors (e.g., demographic and work-related variables) on accident involvement

3.1 Quantitative surveys

Table 1. Summary of quantitative surveys' questionnaires

		Driver category					
Main theme	Sub-theme	Bus	HGV	Car	Mo-	Ath-	Rhodes
Background information	Gender	x	x	x	x	x	x
	Nationality	x	x	x	x	x	x
	Age group	x	x	x	x	x	x
	Driving experience (years)	x	x	x	x	x	x
	Mileage (last 2 years)	x	x	x	x	x	x
	Employment status	x	x	-	-	-	-
	Driving frequency	-	-	x	x	x	x
	Vehicle owner	-	x	-	-	-	-
	No of company employees	x	x	-	-	-	-
	Type of vehicle	x	x	x	x	x	x
	Electric/hybrid vehicle	-	-	x	-	-	-
	Level of education	-	-	x	x	x	x
	Working conditions with	x	x	-	-	-	-
	Salary arrangement	x	x	-	-	-	-
	Work hours arrangement	x	x	-	-	-	-
Organisational safety culture	Management commitment	x	x	-	-	-	-
	Employee commitment to	x	x	-	-	-	-
	Reporting culture and re-	x	x	-	-	-	-
	Safety training	x	x	-	-	-	-
	General safety	x	x	-	-	-	-
Safety behaviors	Traffic safety behavior (e.g become angry, sound horn)	x	x	x	x	x	x
Descriptive norms	Paternalism and traffic	x	x	x	x	x	x
	Trust in authorities' work	x	x	x	x	x	x
	Expectations to other road	x	x	x	x	x	x
Sector traffic safety culture	Sector TSC (e.g. safety level estimation, importance of deadlines, competition)	x	x	-	-	-	-
Peers traffic safety culture	Expectations to friends	-	-	x	x	x	x
	Expectations in my municipality	-	-	x	x	x	x
Interaction	Own experience with tour-	-	-	-	-	-	x
	Differences of local and tourist drivers	-	-	-	-	-	x
Safety outcome	Safety outcomes (e.g. number of accidents, driving with fatigue, experiencing violence at work)	x	x	x	x	x	x

For each of the examined group of road users a quantitative survey was conducted using a specially developed questionnaire. Table 1 summarizes the main themes and sub-themes included in each questionnaire.

3.2 Survey Themes

Background Variables

Surveys included questions on age, gender, mileage, frequency of driving, type of vehicle they usually drive, area type of living, level of education.

The surveys to professional drivers included work-related variables with potential safety consequences, e.g., drivers' experiences with work and time pressure that may compromise safety, payment types (e.g., bonus for efficiency), management focus on driving style, and seat belt use.

Organizational safety culture

Questions were retrieved from the Global Aviation Information Network (GAIN) scale on organizational safety culture and concern:
– management considering safety to be a very important part of all work activities
– management detecting drivers who drive unsafely
– management often praising drivers who drive safely
– drivers reporting safety problems and unsafe situations that they experience at work
– drivers in the company doing all they can to prevent accidents and incidents
– existing company routines (procedures) for reporting safety problems and violations
– correcting promptly all defects or hazards that are reported
– implementing appropriate actions to reduce the chance of reoccurrence of accidents
– adequate driver training for safe driving
– considering safety within the company better than in other companies

Safety behaviors

Traffic safety behaviors are measured by means of the driver behavior questionnaire (DBQ). The DBQ originally distinguished between three types of aberrant behaviors, based on Reason et al. [16] lapses, errors, and violations. Lapses typically involve problems with attention and memory. Errors typically involve observation failures and misjudgments. Violations involve deliberate deviations from safe driving practices [17]. The DBQ answer alternatives have been changed from relative to absolute alternatives as previous research indicates that different demographic groups tend to interpret questions and formulations differently (i.e., what does "often" mean?) [18].

Private car drivers were also asked about the driving behavior of their closest friends who regularly drive a car with the intention to measure peer TSC.

The professional driver survey also included an organizational culture index as well as questions intended to measure sector focus on safety.

Descriptive Norms

Descriptive norms refer to individuals' perceptions of what other people (in the relevant reference group) actually do [14]. The descriptive norms index focuses on the national level, asking the respondents about expectations to other drivers when driving in their country. However, it is expected that drivers primarily assess this based on their experiences with the drivers on their local roads in the regions where they usually drive. Thus, this index may capture regional differences in TSC.

TSC is also measured as values and attitudes, focusing on personal freedom and paternalism through questions on individual freedom to take risk in traffic and questions about authority focus on road safety ("Road safety is one of the most important priorities for the authorities in my country").

Sector safety culture

The surveys among professional drivers include questions on sector safety culture, influenced by previous research on framework conditions for road safety in road transport [19], [20].

Safety Outcomes

Safety Outcomes are reported through one question on respondents' crash involvement while driving (private or professionally) in the last two years.

3.3 Recruitment

The respondents were recruited through a marketing research firm in Greece, which was under the scientific direction of researchers from the National Technical University of Athens (NTUA). Due to difficulties in recruitment, it was decided to approach candidates in person and further explain the scope of the surveys. This eliminated their doubts and fears about confidentiality and the use of the provided information.

Private drivers were recruited in Athens, and on the island of Rhodes. This was based on an assumption that TSC on an island can be different from that in the capital because an island is a geographically closed area.

Professional drivers were recruited from companies fulfilling the following:

- Recruited professional drivers employed in companies, not self-employed,
- The majority (>90%) of bus drivers in each company should be Greeks
- Bus: Each company should have 200-400 drivers
- Bus: Each company should have 100-400 vehicles operating from these units,
- Bus: Recruited drivers should be mostly involved in urban traffic in cities with a population between 50.000 and 200.000, but also drive in rural areas.
- HGV: Mixture of drivers involved in long distance transport and distribution transport.

3.4 Qualitative surveys

A second part of the study concerned the completion of personal semi-structured interviews with drivers from all the examined groups. The purpose of the qualitative interviews was to invite interviewees to present their views on and illustrate the themes and questions in the quantitative survey with concrete examples.

Interviews were conducted by a marketing research company under the direction and supervision of researchers from NTUA. An interview guide was prepared for each group of drivers to help the interviewers guide the discussion. Each guide contained the same questions as the respective survey questionnaire plus some additional "bridge" relevant questions to facilitate the flow of the discussion. The interviewees were partly recruited through companies and partly directly in the areas of the study.

3.5 Sample characteristics

The quantitative surveys were carried out among 705 respondents.

Table 2. Summary of respondents per individual group of drivers

Driver Category	Survey respondents	In-depth interviews
Bus	102	10
HGV	100	10
Private car (Athens)	201	9
Private car (Rhodes)	101	7
Motorcycle (Athens)	120	6
Motorcycle (Rhodes)	81	8
Total	**705**	**50**

The proportion of male respondents was higher among motorcycle riders, and, across modes.

Age distribution also varied by location, with a smaller share of respondents over 46 years old in Rhodes compared to Athens.

Driving frequency was high in both regions, with 77% of respondents in Rhodes and 76% in Athens reporting that they drove daily.

Educational attainment differed slightly between groups: 54% of car drivers and 48% of motorcyclists had completed at least 3–4 years of university or college.

About half of the bus drivers operated local routes, while the other half drove long-distance. The majority were between 46 and 55 years old. In terms of experience, 40% had more than 20 years of professional driving, while 65% had at least 16 years.

Most HGV drivers primarily operated long-distance routes (52%), followed by those combining long-distance and distribution driving (24%).

Among private car drivers, 90% drove passenger cars. A small proportion reported usually driving an electric or hybrid car—5% in Rhodes and 3% in Athens.

Regarding motorcycle characteristics, the three most common types in Greece were scooters (55%), classic motorcycles (21%), and other types (8%). In terms of engine capacity, 77% of riders reported owning motorcycles of up to 500 ccm.

With respect to accident involvement over the past two years, 17% of car drivers and 23% of motorcyclists reported being involved in at least one accident resulting in property damage, personal injury, or fatality.

4 Study limitations and future research

For this study, TSC is defined as shared norms that prescribe certain traffic safety behaviors, shared expectations regarding the behavior of others, and shared values and attitudes. Aside from the inclusion of values and attitudes, this definition aligns with the operationalization of TSC as descriptive norms. Future definitions of TSC may also incorporate additional elements.

When TSC is operationalised as descriptive norms, the mechanism linking shared norms and expectations to safety behaviors can be understood as "subtle social pressures" [14] or as informal rules that create pressure to conform [21]. Importantly, our perception of how others behave may be amplified by false consensus bias, whereby individuals overestimate the prevalence of risky behavior among peers to legitimise their own actions [22]. One way to tackle this argument is to also measure the contribution of peer group TSC as descriptive norms and compare it to national RSC.

A limitation of the study is that the main variables were measured by means of a relatively small number of questions, some of which are narrow in scope. The main reason for this is the relatively high number of variables due to the broad scope of the study. Therefore, a limited number of items measuring each of the main variables was selected to avoid a very long questionnaire. Chosen items have been found to be important in previous research.

Another limitation is that the study is collecting self-reported data, which could be influenced by respondents' memory, truthfulness, and social or psychological biases that may influence reporting.

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